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ABSTRACT

The implementation of a unified national system of non-degree courses in business administration, the Business Economic Council (BEC) courses, replaced the ordinary national diploma and certificate courses in business administration in British colleges in the 1970's. Widespread faculty concern that these new courses have not been providing adequate economics education is examined in this study. A total of 132 BEC national level students at 3 colleges completed a questionnaire and took the Test of Economic Comprehension, covering microeconomics, macroeconomics, and trade and comparative systems. The test was administered as a pretest before the students major economic coursework and again after completion of the courses. The results tended to reinforce faculty concerns. Only 1 of 3 sample groups registered a significant increase in ability, and then only in microeconomics and trade and comparative systems. Findings also indicated a correlation between previous economic knowledge and learning achievement. While the BEC program has encouraged teachers to assess their instruction, it seems clear that the program has not met its goals of developing students' economic knowledge and understanding. A student questionnaire and bibliography are included. (LP)

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ECONOMIC UNDERSTANDING AND BEC NATIONAL LEVEL STUDENTS

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Economic Understanding and BEC National Level Students

by

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Summary

This paper outlines the development of economics at the ordinary national level in colleges of further education. It considers the introduction of Business Education Council (BEC) courses, their aims and objectives and the position of economics within them. It is observed that the established and central role of economics at this intermediate professional level has been challenged by the replacement of the Ordinary National Diploma/Certificate Courses by BEC equivalents.

Concern has been expressed by teachers of economics in many colleges and by representatives of professional bodies with respect to these changes. There exists in particular a belief that economic concepts are given insufficient emphasis in BEC courses. This is a view which has led to assertions that students are unlikely to gain the level of economics understanding essential for an appropriate business education. These claims are examined and attention is paid to the curriculum and teaching strategies which have been imposed with the introduction of BEC.

This empirical study was made in three colleges of further education in the counties of Bedfordshire, Buckinghamshire and Hertfordshire It involved one hundred and thirty two BEC national level students. The test instrument employed was a slightly modified version of the Test of Economics Comprehension (TEC 70). This test was one of a series used in the Economics in Education Project in the U.K. The resultant data gained from pre and post tests of these students are recorded and the outcomes analysed in relation to the rest of the study.

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Research Papers in Economics Education, University of London
Institute of Education. Economics & Business Studies Department.

Author and Title

1. B. D. Cressey. "The Provision of Economics Education in One London Borough" November 1982
2. N. J. Carr. "An Evaluation of the Use of Case Studies in Economics at Advanced Level in Schools." November 1982
3. K.R.J. Wood. "Computer Assisted Learning in a Sixth Form Economics Course" February 1983
4. B. King. "Economic Understanding and BEC National Level Students" September 1983

I. INTRODUCTION

Economics has for some years been regarded by many of the professional bodies as an important discipline and one which is particularly relevant to a business education. The formation of the Business Education Council (BEC) in 1974, with its brief 'to establish, administer and keep under review a unified, national system of non-degree courses in business education', has inevitably had a major impact. This development brought to an end the well-established and accepted courses in business studies which were operated by colleges under the Department of Education and Science 'Rule 124' and which were administered by the Joint Committee for National Awards in Business Studies.

When the BEC Courses were introduced, many economics teachers, especially those teaching at the ordinary national level, expressed concern as to the status and role of economics within the new courses. There remains a belief that economic concepts and ideas are given insufficient emphasis in them. This is a view which has led to assertions that students are unlikely to gain the level of economic understanding essential for an appropriate business education.

The purpose of the empirical research carried out in this study was to measure and examine the level of, and gains made in, economic understanding of 132 BEC national level students registered in three colleges of further education. These students were required to complete a personal questionnaire and were given pre- and post-tests of economic understanding over the second year of their course.

Statistical analyses were conducted in the first instance to establish that the student groups tested in each college were sufficiently homogeneous to be regarded as a single population for the purpose of the research. Frequency distributions were then established to give relevant information about the population. More sophisticated statistical techniques were used to identify differences in performance between the students of the three colleges and to discover the effect of any background variables on the test scores. The resultant data are recorded and the outcomes analysed.

2. THE STUDY DESIGN AND THE SAMPLE POPULATION

This study seeks to investigate the level of economics understanding of a sample of Business Education Council (BEC) students and indirectly the course itself as a vehicle for achieving that understanding. The exercise involves an attempt to measure the performance of a group of these students in the cognitive domain relating to economics. The test instrument used to measure this economics understanding is one of the tests of economic comprehension used in the Economics Education Project. TEC 70 was the particular test selected (Lumsden, 1980). In the original research project this test had been administered to GCE Advanced level students in a number of colleges of further education. A few questions required minor updating of content.

BEC national level courses are believed, at least by many in the further education sector, to provide a genuine vocationally orientated alternative to the more traditional G.C.E. Advanced level course of study for the post ordinary level student. The TEC 70 would therefore appear to be an appropriate instrument to use for the types of student involved in this research.

Furthermore these tests were not designed to be similar to any other examination and they may, according to the test compilers, be considered "to be completely independent measures of economics comprehension" (Lumsden, 1980, p.70).

The test (TEC 70) comprises thirty five multiple choice questions. Each question has four possible responses, only one of which is correct, and the time allowed for completion of the test is fifty minutes. The questions differ in degree of complexity and have been classified, by the compilers, as simple, intermediate and complex. In the test, the first fourteen questions deal with micro economics, questions fifteen to twenty one inclusive involve trade and comparative systems, and the remainder, that is questions twenty two to thirty five, are macro economics based. Students scoring well on the test should, according to the authors, "be able to take a real life economics situation or problem, identify the economic issues involved and choose the likely outcome or appropriate policy" (p.65). It is unfortunate however that no attempt is made by them to define what is meant by 'scoring well.'

The selection of an appropriate test instrument is not an easy task and there are many difficulties involved in providing a test which satisfies all testing criteria. It is possible that the test as a whole or individual questions within it are inappropriate with respect to the economics content of the BEC course. It is possible that the terminology used in the test may be too sophisticated for the students as a whole. It would appear also that the use of objective tests as a way of evaluating student understanding of fundamental concepts in simple or complex applications is not quite as acceptable as it was when these tests were developed.

The use of this particular test cannot therefore imply that the recorded scores may be seen as a definitive measure of an individual's understanding of economics. The test is however believed to be a useful evaluation instrument. It was designed specifically as a test of understanding and it is the level of understanding with which this research is concerned.

A revised TEC 70 was used to measure the performance of the selected troup of students at the beginning of the second academic year of their BEC course and prior to the major part of the economics input contained in the Organisation in its Environment module. The test was given without advance notice. One criticism of the Economics Education Project which is sometimes made is that the use of two different tests for the pre and post measurements allowed for uncontrolled variables in between.

I chose therefore to use the same test for both pre and post measurements in this research. The test was as a result re-administered to the same students, again without prior notification, at the end of the Spring term of the same academic year, 1981/1982. It was not possible to reintroduce the test at a later stage, for instance closer to the end of the final summer term, because of in-college administration and other difficulties. Nonetheless the bulk of the Organisation in its Environment syllabus had been completed in each college supplying students to the exercise by the time of the post test.

The data were collected from one hundred and thirty two students who were enrolled in three colleges of further education, one each in the counties of Bedfordshire, Buckinghamshire and Hertfordshire. No attempt was made to draw a random sample.

The colleges used were selected for convenience of accessibility although I did resist the temptation to use similar colleges based in one county only. There is consequently a likelihood of bias in the non-random selection of the participant students.

Bias may of course be introduced if the sample population is not sufficiently representative of the total population. However, using the statistical breakdown provided by BEC (1982) for the total relevant population, it is possible to identify certain similarities. These statistics have not been compiled in an identical form to my questionnaire but some of the data may be meaningfully compared.

The total population of the BEC National level registrations for 1980/81 (the same year as the sample population registered) was made up of 53% female and 47% male students. The corresponding figures for the sample population are 56% female and 44% male. Seventy three per cent of the total population were registered as part time students compared with 71% of the sample population. Furthermore 44% of the total population were employed in the financial sector (mainly banking) and 27% in the public sector. In the sample 38% were employed in banking and 29% in the public sector.

Much American research indicates that different types of students, as defined by such variables as previous educational performance, attitude, and gender, will benefit differently depending upon course content and instructional technique. Indeed not all members of the student body are equivalent. Within any group there exist wide differences in verbal skills, quantitative abilities and other relevant characteristics.

It is therefore necessary to identify and control for the underlying determinants of student learning. An exhaustive list of everything that could conceivably affect cognitive development is not possible and I have as a result sought to use a restricted set of variables which appears to be justifiable given limited resources and a review of recent research findings. Prior to completing the pre test, the students were, accordingly, requested to complete a personal questionnaire (appendix 1) comprising a series of questions concerning the respondent's age, sex, mode of attendance, occupation, previous academic record and attitude to economics education.

The students in the sample had an age range of twenty years, from seventeen to thirty seven years of age. Only five students were aged over twenty one years and ninety nine of the total sample of one hundred and thirty two students were aged in the very narrow range of seventeen to nineteen years. The arithmetic mean average age was 18.59 years and the standard deviation 2.30 years.

Seventy four of the sample population were female (56%), There were twenty two female students enrolled on full time BEC national diploma courses and sixteen males, providing a total full time diploma enrolment in the three colleges of thirty eight students. This group accounted for 29% of the sample population. The majority of students in the total group (71%) were part time certificate students. Of these ninety four individuals, fifty two were female.

The qualifications by which the students gained entry to the course were heavily related to the G.C.E., or its equivalent, route, that is four GCE Ordinary level passes (Grades A, B or C) or four C.S.E. Grade 1 passes or a combination of both.

In fact, one hundred and thirteen (86%) of the students qualified in this way and a majority of them (58%) possessed four GCE Ordinary level passes at the appropriate grades. Of the remaining thirty six students so qualified, thirty three had a mixture of GCE and CSE Grade 1 passes, two held four CSE Grade 1 passes and one student was accepted on the basis of the American equivalent to GCE Ordinary level.

Interestingly enough, only fourteen students (10%) had reached this stage of the BEC provision via a preliminary BEC general level course and of them only three had followed a day release certificate course. Four students had entered the course without the required formal academic qualifications by way of the 'over nineteen years of age at the principal's discretion' rule. One student did not complete this question.

With respect to the employment background of the ninety four part time students, the questionnaire revealed that sixty eight (72%) were employed in the private sector, over one half of whom (thirty eight) worked in banking. Of the other twenty six, sixteen were employed in local government occupations, four in central government based jobs and six were employed in the nationalised industries.

Little insight was gained into their actual occupations. Only eight (9%) of all employed students claimed to work in an accountancy capacity. This lack of precise information was in part the result of a degree of ambiguity in the question put, although too much detail would have been difficult to code in a meaningful way.

The survey revealed that only twenty seven (20%) of the one hundred and thirty two students had studied economics prior to enrolling on the BEC course. Fourteen of them had gained either a GCE Ordinary level Grade A, B or C or a CSE Grade 1 pass in economics. One student had studied economics to GCE Advanced level but without examination success.

Commerce proved to be an even less familiar subject to these students, only six of them (less than 5%) having been exposed to the subject. Four of the six had gained a GCE Ordinary level pass or its equivalent however. Surprisingly, six students claimed not to have been exposed to mathematics prior to enrolment, but of the one hundred and twenty six who did, eighty seven (65%) recorded either a GCE Ordinary level or CSE Grade 1 pass.

Three questions were included in the questionnaire with the specific intention of recording the level of interest in economics of these students. The first such question enquired into their reading of financial or business materials. Two of the returned questionnaires did not indicate one way or the other, but one hundred and twelve replied that they did not read such material on a regular basis in spite of their enrolment on a vocationally orientated business studies course. The eighteen affirmative responses account for only a little over thirteen percent of the total group tested.

The students' view of what constitutes financial or business material covered much of the national press, namely the Sunday Times, Observer, Guardian, Financial Times, Times, Daily Mail, Daily Express and the Daily Mirror. The lack of attention paid by the students to the numerous sources of appropriate material will probably come as no surprise to teaching staff involved with such courses, but it is surely indicative of a certain lack of involvement on the part of the BEC national consumer.

A second question asked specifically for a self-assessment on interest in economics. The respondent was given a five point scale which was scored 1 for a 'very high' interest, 2 for 'high'interest, 3 for 'average' interest, 4 for 'low' interest and 5 for 'very low' interest. The arithmetic mean of responses was 3.25 with a standard deviation of 0.70. The measures of central tendency and dispersion of the group's responses hide the fact that no individual recorded a very high (1)interest rating. Twelve rated their interest as high and of the other eighty, one claimed an average interest, thirty two said their interest was low and seven very low. Thus of the recorded responses for this group of 'vocationally orientated' students less than one in ten of them admitted to an above average interest in economics. One must take care in the interpretation of this statistic, as no guidance was given as to how the student should interpret the word 'average' - i.e. average in the community?, the rest of the class?, the student's peer group at work?

The third interest-based question put to the students involved the students' attitude to the overall importance of economics to our society. Again a five-point scale was used and the responses given were as follows: eight said it was very important, sixty two thought it important, fifty said it was fairly important and ten thought it unimportant, with one individual believing it to be very unimportant. The arithmetic mean average of these scores was calculated at 2.46, that is between fairly important (3) and important (2). The standard deviation was 0.78.

3. THE PRE TEST FINDINGS

The three colleges of further education (A, B and C) which were involved in this exercise provided thirty nine (of which 17 were full time diploma students and 22 part time certificate students), fifty eight (12,46) and thirty five (9,26) students respectively. Basic statistics and one-way analysis of variance were used in order to compare these three groups in order to ascertain whether or not it is feasible to consider them as constituting a single population on the sub-tests of the total test of economics understanding. These tests were created in line with the structure of the test of economic comprehension (TEC 70) namely for micro (Questions 1-14), trade and comparative systems (Questions 15-21) and macro (Questions 23-35).

Average scores reported in the resultant statistics are the result of treating incorrect answers as 0 and correct answers as 1. The F analysis of variance statistic is used to identify any significant differences between the groups in respect of any of the criterion variables including both the questionnaire and test of understanding.

The result of the use of one way analysis of variance to identify any such differences in the questionnaire responses is shown in Table 3.1. It may be seen that in only three cases are the results significant at the 0.05 level, and of them, two would inevitably be identical because the mode of attendance in all three colleges determines the nature of the course on which the student is enrolled, that is to say there are no part time diploma or full time certificate students in these colleges although the rules of the Business Education Council do not preclude this.

TABLE 3.1

QUESTIONNAIRE RESPONSES

CRITERION VARIABLE	F STATISTIC BETWEEN GROUPS	SIGNIFICANCE
AGE	0.374	0.688
SEX	0.226	0.798
COURSE ON WHICH ENROLLED	3.171	0.045
ENTRY QUALIFICATIONS	2.156	0.120
MODE OF ATTENDANCE	3.171	0.145
NATURE OF EMPLOYER'S BUSINESS	0.101	0.904
NATURE OF STUDENT'S OCCUPATION	3.783	0.025
PREVIOUS COURSE IN ECONOMICS	0.889	0.413
PREVIOUS COURSE IN COMMERCE	0.462	0.631
PREVIOUS COURSE IN MATHEMATICS	0.849	0.430
READING OF BUSINESS MATERIALS	1.413	0.247
PRESENT INTEREST IN ECONOMICS	0.222	0.802
IMPORTANCE OF ECONOMICS	0.997	0.371

Differences then are shown really in terms of only two variables. First in respect of the mode of attendance and therefore in the type of course on which the student is enrolled, it may be seen that there is a higher percentage of full time national diploma students in College A. The results of treating full time attendance as 1 and part-time attendance as 2 give arithmetic mean averages for the three colleges of: College A 1.56 and colleges B and C 1.79 and 1.74 respectively. The percentage of full time students in College A is 44%, in College B 21% and in College C 26%.

Secondly, on the nature of the students' employment, it may also be seen, in Table 3.1, that there is a significant difference between colleges. In this case, College A has more students in accountancy jobs than the other two colleges, but the actual numbers are small.

An examination of Table 3.2, in which the student responses to each question in the pre-test are considered, reveals that in only three questions is there a significant difference at the 0.05 level between the colleges. In question 1, noticeably fewer students from College A answered the question correctly as compared with the other students. Treating a correct answer as 1 and an incorrect or no answer as 0, the arithmetic mean of the entire group was 0.83. College A's students scored an arithmetic mean average of 0.69, B's scored 0.93 and C's 0.83.

TABLE 3.2

ANALYSIS OF PRE TEST SCORES

QUESTION NUMBER	NUMBER OF CORRECT RESPONSES	$\bar{X}$	σ	VARIANCE	BETWEEN GROUPS F	BETWEEN GROUPS SIG.
1	110	0.8333	0.3741	0.1399	5.045	0.008
2	22	0.1667	0.4310	0.1858	2.110	0.125
3	13	0.0985	0.2991	0.0895	1.729	0.182
4	32	0.2424	0.4302	0.1851	1.433	0.242
5	29	0.2197	0.4156	0.1727	1.299	0.276
6	19	0.1439	0.3524	0.1242	1.001	0.370
7	45	0.3409	0.4758	0.2264	0.384	0.682
8	29	0.2197	0.4156	0.1727	2.569	0.080
9	40	0.3030	0.4613	0.2128	0.025	0.975
10	37	0.2803	0.4509	0.2033	0.890	0.413
11	80	0.6061	0.4905	0.2406	2.034	0.135
12	28	0.2121	0.4104	0.1684	0.748	0.475
13	59	0.4470	0.4891	0.2491	1.035	0.358
14	59	0.4470	0.4991	0.2491	4.406	0.014
15	60	0.4545	0.4998	0.2498	0.455	0.636
16	48	0.3636	0.4829	0.2332	2.212	0.114
17	31	0.2348	0.4255	0.1811	0.812	0.446
18	21	0.1591	0.3672	0.1348	0.314	0.731
19	46	0.3485	0.4783	0.2288	0.466	0.628
20	53	0.4015	0.4921	0.2421	1.651	0.196
21	86	0.6515	0.4783	0.2288	1.694	0.188
22	24	0.1818	0.3872	0.1499	0.370	0.691
23	35	0.2652	0.4431	0.1963	0.335	0.716
24	25	0.1894	0.3933	0.1547	0.700	0.499
25	16	0.1212	0.3276	0.1073	0.556	0.575
26	72	0.5455	0.4998	0.2498	0.338	0.714
27	37	0.2803	0.4509	0.2033	0.227	0.797
28	45	0.3409	0.4758	0.2264	2.148	0.121
29	20	0.1515	0.3599	0.1295	1.327	0.269
30	36	0.2727	0.4471	0.1999	0.821	0.442
31	27	0.2045	0.4049	0.1639	0.810	0.447
32	44	0.3333	0.6193	0.2697	0.067	0.935
33	62	0.4697	0.5010	0.2510	1.066	0.347
34	42	0.3182	0.4675	0.2186	3.134	0.047
35	24	0.1818	0.3872	0.1499	0.296	0.744

Note: The analysis in Table 3.2 is based upon the recording of a correct response as 1 and an incorrect, or no, response as 0. The percentage of correct responses for each question may be achieved simply by multiplying each $\bar{X}$ by 100.

In the other two cases, namely Questions 14 and 34, College A's students score significantly better than the other students. Question 14 may be seen to have produced an arithmetic mean average for the total group of 0.44, with students from Colleges A, B and C recording scores of 0.64, 0.36 and 0.37 respectively. Question 34 follows the same pattern, with an arithmetic mean average score of 0.32, with the colleges scoring 0.46, 0.29 and 0.20.

The results of the three tests involving the micro, trade and comparative systems and macro divisions of the overall test are shown in Table 3.3. None of the differences observed in these results are significant at the 0.05 level, and those differences which do exist are probably the result of random variations within the groups.

TABLE 3.3

ANALYSIS BY STRUCTURE OF THE TEST

CRITERION	COLLEGES A		COLLEGES B		COLLEGES C		ALL THREE COLLEGES		BETWEEN GROUPS	
VARIABLE	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	F	SIG.
MICRO	4.6	1.4	4.4	1.6	4.7	1.9	4.6	1.7	0.34	0.70
Trade and comparative	2.9	1.4	2.4	1.2	2.6	1.3	2.6	1.2	1.62	0.20
MACRO	4.0	1.9	3.8	2.4	3.7	1.7	3.8	2.0	0.17	0.84

Further consideration of the questionnaire and pre-test data reveals that students enrolled on the National level course by virtue of a successful completion of the BEC General Course tended to fare less well as a group than the average student. There were however only fourteen such students and their arithmetic mean average mark of 9.29, which fell short of the 11.03 for the entire group, may not be too significant. Students aged over nineteen years on enrolment on the course and without formal academic qualifications divided evenly into those scoring well above and those scoring well below the average. Despite their overall average of 11.25 little may be gleaned from the figures, as the number of students involved was very small, only four students.

Differences in performance in tests of economic understanding have been attributed to gender in many research papers to date. In this pre-test, it is observed that recorded male average scores are higher than female ones and that the difference is greater than in the published results of the Economics Education Project for the same test. Test scores classified by gender are recorded in Table 3.4.

TABLE 3.4

PRE TEST SCORES BY GENDER

GENDER	DIPLOMA (FULL-TIME) $\bar{X}$	CERTIFICATE (PART-TIME) $\bar{X}$	TOTAL $\bar{X}$
MALES	12.44	11.40	11.69
FEMALES	9.68	10.67	10.38
ALL	10.64	11.16	11.03

Table 3.5 shows the distribution of actual scores in terms of their frequency. The data is recorded for full and part time students independently as well as for the whole group. The modal average score for the whole group is seen to be twelve, as indeed it is for both full and part time students if they are identified separately.

TABLE 3.5

DISTRIBUTION OF PRE TEST SCORES

RECORDED SCORE	STUDENT NUMBER FULL TIME	PART TIME	ALL	CUMULATIVE FREQUENCY	PERCENTILE RANKING (nearest whole no.)
3	1	2	3	3	2
4	1	1	2	5	4
5	1	2	3	8	6
6	0	5	5	13	10
7	3	5	8	21	16
8	1	7	8	29	22
9	2	8	10	39	30
10	7	10	17	56	42
11	4	7	11	67	51
12	8	14	22	89	67
13	4	11	15	104	79
14	2	10	12	116	88
15	1	5	6	122	92
16	3	2	5	127	96
17	0	4	4	131	99
18	0	1	1	132	100

4. STATISTICAL ANALYSES

The pre-test results and data collected from the questionnaire were used in Section 2 to establish that the one hundred and thirty two students of the three Colleges of Further Education might be regarded as a single population. However, the total number of students completing both pre and post tests was only one hundred and twelve. The 'missing' twenty students were either absent on the day of the post test or had left the course during the interval between tests. I have elected to exclude these twenty students from the analysis which follows, in the belief that this will provide a more appropriate matched sample decision.

An analysis of the missing students shows their absences to have little impact on the overall distribution of the sample population in terms of the criterion variables specified in the questionnaire. The sample population became very slightly more biased towards female students and those employed in the public sector.

Statistical analysis was undertaken involving the preparation of frequency distributions which give relevant information about how many students were classified and in what ways.

This was followed by calculations of one way analysis of variance in order to identify any differences existing within each test period among the three colleges. Further analysis was conducted by means of t-tests designed to inform about the test score differences between the pre (t_1) and post (t_2) tests. Pearson's

product moment correlation coefficients were used to identify which, if any, background variables were correlated with student responses to each item and each sub-test. Finally stepwise regression analyses were used to examine the differences in test scores as a function of background and college differences.

The suitability of regression analysis in handling research data of this kind is occasionally brought into question. Many economics educators have however typically restricted their analysis to multiple linear regression. According to Soper (1977 p.239) the restriction is desirable in the general case in that the regression approach provides the best test of a fully specified model of the type usually encountered in economic educational evaluation. In the United Kingdom Lumsden, Attiyeh and Scott (1980) used multiple regression in analysing their research data. The value of multiple regression analysis is that it shows a relationship between several independent variables and one dependent variable.

However, not all researchers agree that this is the ideal approach. Johnson (1979) suggests that with the increasing sophistication of research in economics education, many methodological problems have become apparent that were not previously considered. Warwick (1975 p.517) states that "as the number of variables in the data set that must be brought into the regression equation increases multiple regression becomes more and more unwieldly as a research instrument." Marlin and Niss (1980 p.21) point out that since there are a large number of input variables in the education production function and a large number of possible outputs one should expect some problems with multiple regression analysis.

Frequency distribution

A number of the frequency distributions which follow do little more than provide similar information to that already recorded in the description of the original one hundred and thirty two students. However, further statistics have been calculated on the basis of the revised sample of one hundred and twelve and therefore these distributions are important.

AGE

TABLE 4.1 AGE STUDENTS' AGE DISTRIBUTION (SEPTEMBER 1981)

AGE (YEARS)	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY	CUMULATIVE FREQUENCY %
17	43	38.4	38.4
18	29	25.9	64.3
19	12	10.7	75.0
20	20	17.9	92.9
21	2	1.8	94.6
22	2	1.8	96.4
23	1	0.9	97.3
24	1	0.9	98.2
26	1	0.9	99.1
37	1	0.9	100.0
TOTALS	112	100	

As may be observed from Table 4.1, the modal age is seventeen years. The median age is 17.95 years and the mean age is 18.54 years. The standard deviation is 2.40 years.

GENDER

The one hundred and twelve students comprised sixty five females and forty seven males. Fifty eight percent of the sample population therefore were female students.

COURSE ON WHICH ENROLLED

Students were classified on the basis of registration for either the full time BEC National diploma or part time National Certificate course. The relevant frequencies in this case are thirty four (30.4%) and seventy eight (69.6%) respectively.

ENTRY QUALIFICATIONS

The most common entry criteria achieved by the sample population proved to be four passes (i.e. Grades A, B or C) in the GCE Ordinary level.

TABLE 4.2

STUDENTS' ENTRY QUALIFICATIONS

QUALIFICATION	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
BEC GENERAL CERTIFICATE	8	7.1	7.1
BEC GENERAL DIPLOMA	3	2.7	9.8
GCE O LEVELS 4 GRADES A-C	64	57.1	66.9
GCE O LEVELS & CSE 1s	30	26.8	93.7
4 CSE GRADE 1s	2	1.8	95.5
THE OVER 19 YEARS OF AGE RULE	4	3.6	99.1
OVERSEAS O LEVEL EQUIVALENT(USA)	1	0.9	100.0
TOTALS	112	100.0	

NATURE OF EMPLOYER'S BUSINESS

Over seventy percent (fifty six out of seventy eight) of the part time BEC National level certificate students enrolled were employed by firms in the private sector. The largest single category was that of the banks' employees - thirty one in all.

TABLE 4.3

EMPLOYER'S BUSINESS

EMPLOYERS	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
NONE - FULL TIME	34	30.4	30.4
BANKING	31	27.7	58.1
LOCAL GOVERNMENT	12	10.7	68.8
NATIONALISED INDUSTRY	6	5.4	74.1
PRIVATE ENTERPRISE OTHER THAN BANKING	25	22.3	96.4
CENTRAL GOVERNMENT SERVICES	4	3.6	100.0
TOTALS	112	100.0	

NATURE OF STUDENT'S EMPLOYMENT

TABLE 4.4

STUDENT'S FULL-TIME EMPLOYMENT

EMPLOYMENT IN	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
NONE (FULL TIME STUDENTS)	34	30.4	30.4
ACCOUNTING	7	6.3	36.7
OTHER	71	63.3	100.0
TOTALS	112	100.0	

PREVIOUS COURSE IN ECONOMICS, COMMERCE AND MATHEMATICS

The Table 4.5 indicates, in a very limited way, the educational record of the sample population in respect of these subject areas prior to enrolment on the BEC national course.

TABLE 4.5

STUDENTS' ENROLMENT RECORD IN SELECTED SUBJECTS

GCE O LEVEL (OR EQUIVALENT) RESULT	PREVIOUS COURSE IN ECONOMICS			COMMERCE			MATHEMATICS		
	ABS. FRE.	REL. FRE(%)	CUM. FRE(%)	ABS. FRE.	REL. FRE(%)	CUM. FRE(%)	ABS. FRE.	REL. FRE(%)	CUM. FRE(%)
PASS A, B or C	10	8.9	8.9	3	2.7	2.7	74	66.1	66.1
FAIL	9	8.0	16.9	2	1.8	4.5	33	29.5	95.6
NOT TAKEN	93	83.1	100.0	106	94.6	99.1	5	4.5	100.0
NO RESPONSE	0	0	100.0	1	0.9	100.0	0	0	100.0
TOTALS	112	100.0		112	100.0		112		

FINANCIAL AND BUSINESS MATERIALS

When asked if they read the financial/business section of a newspaper or magazine the students replied in the affirmative in only sixteen cases which represents a percentage of the total sample of 14.3.

STUDENT INTEREST IN ECONOMICS

The students were asked how they would rate their present interest in economics (September 1981). The frequencies of their responses are as follows:

TABLE 4.6

STUDENT INTEREST

SELF ASSESSMENT OF INTEREST	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
VERY HIGH	0	0	0
HIGH	12	10.7	10.7
AVERAGE	67	59.8	70.5
LOW	26	23.2	93.7
VERY LOW	7	6.3	100.0
TOTALS	112	100.0	

THE IMPORTANCE OF ECONOMICS

The students were also asked to give their view as to the importance of a general understanding of economics in today's world.

Table 4.7

THE IMPORTANCE OF ECONOMICS

STUDENT ASSESSMENT	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY(%)	CUMULATIVE FREQUENCY(%)
VERY IMPORTANT	8	7.1	7.1
IMPORTANT	55	49.1	56.2
FAIRLY IMPORTANT	41	36.6	92.8
FAIRLY UNIMPORTANT	7	6.3	99.1
VERY UNIMPORTANT	1	0.9	100.0
TOTALS	112	100.0	

INDIVIDUAL QUESTIONS

An analysis of the pre and post tests scores in respect of each of the thirty five items yields the distribution shown in Table 4.8. Responses are coded on the basis of 1 = a correct answer and 0 = an incorrect one.

Table 4.8

RESPONSES TO INDIVIDUAL QUESTIONS

	PRE TEST RESULTS				POST TEST RESULTS			
QUESTION NUMBER	CORRECT RESPONSES	% OF ALL STUDENTS	$\bar{x}$	σ	CORRECT RESPONSES	% OF ALL STUDENTS	$\bar{x}$	σ
1	95	84.8	0.85	0.36	97	86.6	0.87	0.34
2	17	15.2	0.15	0.45	22	19.6	0.20	0.40
3	12	10.7	0.11	0.42	22	19.6	0.20	0.40
4	25	22.3	0.22	0.42	38	33.9	0.34	0.48
5	24	21.4	0.21	0.41	30	26.8	0.27	0.44
6	16	14.3	0.14	0.35	35	31.3	0.31	0.46
7	34	30.4	0.30	0.46	49	43.8	0.44	0.50
8	21	18.8	0.19	0.40	23	20.5	0.20	0.41
9	36	32.1	0.32	0.47	25	22.3	0.22	0.42
10	33	29.5	0.29	0.46	43	38.4	0.38	0.49
11	69	61.6	0.62	0.49	37	33.0	0.33	0.47
12	22	19.6	0.20	0.40	25	22.3	0.22	0.42
13	49	43.8	0.44	0.50	54	48.2	0.48	0.50
14	51	45.5	0.45	0.50	64	57.1	0.57	0.50
15	49	43.8	0.44	0.50	50	44.6	0.45	0.49
16	40	35.7	0.36	0.48	48	42.9	0.43	0.50
17	28	25.0	0.25	0.43	40	35.7	0.36	0.48
18	17	15.2	0.15	0.36	21	18.8	0.19	0.39
19	41	36.6	0.37	0.48	53	47.3	0.47	0.50
20	47	42.0	0.42	0.50	49	43.8	0.44	0.50
21	74	66.1	0.66	0.48	82	73.2	0.73	0.44
22	20	17.9	0.18	0.38	20	17.9	0.18	0.38
23	28	25.0	0.25	0.43	33	29.5	0.29	0.44
24	20	17.9	0.18	0.38	10	8.9	0.09	0.29
25	14	12.5	0.12	0.33	6	5.4	0.05	0.23
26	59	52.7	0.53	0.50	47	42.0	0.42	0.50
27	31	27.7	0.28	0.45	51	45.5	0.45	0.50
28	39	34.8	0.35	0.48	27	24.1	0.24	0.43
29	17	15.2	0.15	0.36	24	21.4	0.21	0.41
30	32	28.6	0.29	0.45	29	25.9	0.26	0.44
31	22	19.6	0.20	0.40	24	21.4	0.21	0.41
32	32	28.6	0.29	0.52	56	50.0	0.50	0.50
33	53	47.3	0.47	0.50	71	63.4	0.63	0.48
34	36	32.1	0.32	0.45	42	37.5	0.37	0.49
35	21	18.8	0.19	0.39	22	19.6	0.20	0.40

In seven of the questions, it was noticeable that fewer students responded correctly in the post test than had done so in the pre test. The questions concerned are numbers 9, 11, 24, 25, 26, 28 and 30.

When the original test was administered by the Economics Education Project to A level economics students in further education establishments, the percentage of correct responses to the above questions was as follows: 30, 43, 37, 21, 61, 45 and 24. (Lumsden, Attiyeh and Scott, 1980, p.178). Three of the seven questions were classified as simple by the test writers, two were intermediate and two complex.

This result may have been caused by waning interest on the part of the students which then picked up again as they neared completion of the post test. However a reduction in the number of correct responses to question eleven from sixty nine in the pre test to thirty seven in the post test is surprising, and raises the strong possibility that guessing featured significantly.

The micro-economics Sub-test

Table 4.9

STUDENT SCORES ON THE MICRO QUESTIONS (NOS. 1 - 14)

SCORE (MAXIMUM = 14)	PRE TEST RESULTS ABSOLUTE FREQUENCY	RELATIVE FREQUENCY %	CUMULATIVE FREQUENCY %	POST TEST RESULTS ABSOLUTE FREQUENCY %	RELATIVE FREQUENCY %	CUMULATIVE FREQUENCY %
0	1	0.9	0.9	0	0.0	0.0
1	1	0.9	1.8	2	1.8	1.8
2	7	6.3	8.1	8	7.1	8.9
3	20	17.9	26.0	13	11.6	20.5
4	32	28.6	54.6	22	19.6	40.1
5	23	20.5	75.1	15	22.3	62.4
6	14	12.4	87.5	17	15.2	77.6
7	9	8.0	95.5	15	13.4	91.0
8	3	2.7	98.2	5	4.5	95.5
9	2	1.8	100.0	3	2.7	98.2
10	0	0.0	100.0	2	1.8	100.0
TOTALS	112	100.0		112	100.0	

Student scores on the micro economics sub-test of the total test of economics understanding show increases, albeit relatively small ones, when the three customary measures of central tendency are used to represent the data. The mode average score rises from four to five correct responses. The median average from 4.36 to 4.94 and the arithmetic mean average score is increased from 4.57 to 5.04. The dispersion of scores within the group around the arithmetic mean is also increased as indicated by the standard deviation meausrements of 1.60 in the pre test and 1.90 in the post test.

Differences in individual student scores on the micro sub-test between the pre test (t_1) and the post test (t_2) are taken as $t_1 - t_2$, that is the larger the negative change shown the greater the improvement in the test score.

TABLE 4.10

DIFFERENCES IN MICRO ECONOMICS SUB TEST SCORES

$t_1 - t_2$	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
-6	2	1.8	1.8
-4	5	4.5	6.3
-3	14	12.5	18.8
-2	16	14.3	33.0
-1	18	16.1	49.1
0	23	20.5	69.6
1	18	16.1	85.7
2	6	5.4	91.1
3	4	3.6	94.6
4	5	4.5	99.1
5	1	0.9	100.0
TOTAL	112	100.0	

These results indicate that less than half of the student group (49.1%) actually increased their test score on the micro based questions in the post test as compared

with their pre test performances. Over thirty percent (30.4%) of the students tested actually recorded lower scores in the post test than in the pre test. In two of the measures of average used increased scores were recorded, the arithmetic mean and the median showing increases of 0.51 and 0.46 respectively. The model average however showed no change in score between tests.

Trade and Comparative Systems sub test

A similar pattern of results involving modest gains in the post test results can be seen in the trade and comparative systems sub test data.

TABLE 4.11

STUDENT SCORES ON THE TRADE AND COMPARATIVE SYSTEMS QUESTIONS (NOS. 15 - 21).

	PRE TEST RESULTS			POST TEST RESULTS		
SCORE (MAXIMUM 7)	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY %	CUMULATIVE FREQUENCY %	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY %	CUMULATIVE FREQUENCY %
0	3	2.7	2.7	2	1.8	1.8
1	18	16.1	18.8	14	12.5	14.3
2	33	29.4	48.2	25	22.3	36.6
3	29	25.8	74.0	27	24.1	60.7
4	21	18.8	92.8	27	24.1	84.4
5	7	6.3	99.1	12	10.7	95.5
6	1	0.9	100.0	5	4.5	100
TOTAL	112	100.0		112	100.0	

The modal score is seen to rise from two correct responses in the pre test to become three and four in the bimodal post test distribution. The median score increases from 2.62 to 3.09 correct responses whilst the mean score is increased from 2.71 to 3.12 correct responses. As with the micro sub test results, the dispersion of scores around the arithmetic mean widened slightly giving a standard deviation measure of 1.35 in the post test as compared with 1.19 in the pre test.

Fewer of the students tested recorded an increase in the number of correct responses to these questions than had been the case in respect of the micro economics sub test. The actual percentage is 35.5 as may be seen in Table 4.12. It is also shown that as with the micro sub-test, the modal average in respect of score differences is zero - i.e., no change in score. The other measures of average used however show small increases. The mean indicated an improvement in score of 0.42 and the median one of 0.35.

TABLE 4.12

DIFFERENCES IN TRADE AND COMPARATIVE SYSTEMS SUB TEST SCORES

$t_1 - t_2$	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY (%)	CUMULATIVE FREQUENCY (%)
-4	4	3.6	3.6
-3	10	8.9	12.5
-2	9	8.0	20.5
-1	28	25.0	45.5
0	33	29.5	75.0
1	16	14.3	89.3
2	7	6.3	95.5
3	5	4.5	100.0
TOTALS	112	100.0	

Macro Economics sub test

TABLE 4.13

STUDENT SCORES ON THE MACRO QUESTIONS (NOS. 22-35)

SCORE (MAXIMUM = 14)	PRE TEST RESULTS ABSOLUTE FREQUENCY	PRE TEST RESULTS RELATIVE FREQUENCY %	PRE TEST RESULTS CUMULATIVE FREQUENCY %	POST TEST RESULTS ABSOLUTE FREQUENCY	POST TEST RESULTS RELATIVE FREQUENCY %	POST TEST RESULTS CUMULATIVE FREQUENCY %
0	6	5.4	5.4	3	2.7	2.7
1	9	8.0	13.4	5	4.5	7.2
2	13	11.6	25.0	11	9.8	17.0
3	25	22.3	47.3	18	16.0	33.0
4	20	17.9	65.2	28	25.0	58.0
5	16	14.3	79.5	21	18.7	76.7
6	10	8.9	88.4	20	17.9	94.6
7	9	8.0	96.4	4	3.6	98.2
8	2	1.8	98.2	2	1.8	100.0
9	2	1.8	100.0	0	0.0	100.0
TOTALS	112	100.0		112	100.0	

Although the dispersion of test scores as measured by the standard deviation on the macro economics sub test was found to be less in the post test (1.58) than it had been in the pre test (1.89) the measures of average all produced similar results to the two other sub-tests. The modal score increased from three correct responses to four. The median rose from 3.80 to 4.23 and the mean increased from 4.028 to 4.24.

Over one half of the students recorded an improved score on the post test over their pre test result and the modal difference in score actually increased by one correct response. The mean difference showed an improvement of 0.31 whilst the median difference also indicated an improvement of 0.64 of a correct response.

TABLE 4.14

DIFFERENCES IN MACRO ECONOMICS SUB TEST SCORES

$t_1 - t_2$	ABSOLUTE FREQUENCY	RELATIVE FREQUENCY %	CUMULATIVE FREQUENCY %
-5	1	0.9	0.9
-4	6	5.4	6.3
-3	10	8.9	15.2
-2	20	17.9	33.0
-1	22	19.6	52.7
0	15	13.4	66.1
1	13	11.6	77.7
2	9	8.0	85.7
3	10	8.9	94.6
4	5	4.5	99.1
5	1	0.9	100.0
TOTALS	112	100.0	

ANALYSIS OF VARIANCE

The analysis of variance statistics are used to highlight any differences which may exist between colleges in each test period. The general finding of this exercise is that there are no major differences among the colleges in either pre or post test results. Minor background differences do exist but it is reasonable to assume that the colleges collectively represent one student population.

It may be recalled that similar analysis of variance measurements on the full one hundred and thirty two student sample population revealed only two significant differences in student attributes between the colleges. These were slight differences on the nature of the course, i.e. diploma or certificate (and therefore the mode of attendance) and on the nature of the student's occupation. Table 4.15, which relates only to the one hundred and twelve students who completed both pre and post tests, shows that only the nature of the student's occupation remains statistically significantly different at the 5% level.

TABLE 4.15

QUESTIONNAIRE RESPONSES FOR STUDENTS COMPLETING PRE & POST TESTS

CRITERION VARIABLE	BETWEEN GROUPS F STATISTIC	SIGNIFICANCE
AGE	0.366	0.6943
SEX	0.078	0.9249
COURSE ON WHICH ENROLLED	2.607	0.0784
ENTRY QUALIFICATIONS	1.939	0.1488
MODE OF ATTENDANCE	2.607	0.0784
NATURE OF EMPLOYERS BUSINESS	0.314	0.7315
NATURE OF STUDENT OCCUPATIONS	3.274	0.0416**
PREVIOUS COURSE IN ECONOMICS	0.590	0.5560
PREVIOUS COURSE IN COMMERCE	0.778	0.4617
PREVIOUS COURSE IN MATHEMATICS	2.702	0.0715
READING OF BUSINESS MATERIALS	0.739	0.4800
PRESENT INTEREST IN ECONOMICS	0.036	0.9650
IMPORTANCE OF ECONOMICS	1.066	0.3478

** = significant at 0.05 level.

Table 4.16, when compared with the one hundred and thirty two case pre test findings, again shows a limited number of questions which produced significantly different answers between the groups. It may be observed that in the pre test questions 1 and 14 remain as provoking statistically significant (at the 5% level) different answers between the groups. Additionally, significantly different responses were identified in respect of question 12, for which College C produced no correct answers, while 27% and 25% of the students from Colleges A and B respectively answered correctly.

Question 28 also demonstrated significantly different (at the 5% level) responses between groups with the proportions of correct responses made by students of Colleges A, B and C being 30%, 47% and 19% respectively. However question 34 did not produce significantly different responses between groups as it had previously done with the larger number of cases.

Post test results show that five questions provoke significantly different responses between colleges. In four of these questions College B scored relatively highly when compared with the other two colleges. These questions were those numbered 4, 8, 17 and 18. In question 19, College B students scored far less than those in other colleges.

TABLE 4.16

ONE WAY ANALYSIS OF VARIANCE OF PRE & POST TEST SCORES (N = 112)

BETWEEN GROUPS

QUESTION NUMBER	PRE TEST F STATISTIC	PRE TEST SIGNIFICANCE	POST TEST F STATISTIC	POST TEST SIGNIFICANCE
1	3.944	0.0222	1.244	0.2922
2	1.869	0.1591	0.873	0.4206
3	1.460	0.2368	1.713	0.1852
4	0.130	0.8782	3.148	0.0469
5	1.174	0.3130	0.965	0.3842
6	0.551	0.5779	0.315	0.7303
7	0.407	0.6664	0.186	0.8302
8	0.622	0.5387	3.320	0.434
9	0.041	0.9599	1.427	0.2445
10	0.531	0.5897	1.274	0.2839
11	2.060	0.1324	1.739	0.1805
12	4.626	0.0118	0.020	0.9804
13	1.314	0.2729	0.113	0.8929
14	4.540	0.0128	0.216	0.8062
15	0.663	0.5172	0.056	0.9459
16	1.850	0.1621	0.450	0.6389
17	1.071	0.3464	4.578	0.0123
18	0.002	0.9978	3.767	0.0262
19	0.340	0.7124	7.476	0.0009
20	2.095	0.1280	0.524	0.5938
21	2.422	0.0935	0.400	0.6712
22	0.257	0.7737	0.795	0.4542
23	0.274	0.7605	2.128	0.1240
24	0.557	0.5744	0.125	0.8823
25	0.634	0.5322	1.952	0.1469
26	0.481	0.6196	0.847	0.4317
27	0.682	0.5079	0.391	0.6776
28	3.304	0.0405	1.890	0.1560
29	1.848	0.1625	0.462	0.6315
30	1.814	0.1678	0.560	0.5727
31	0.908	0.4062	1.316	0.2725
32	0.502	0.6069	2.000	0.1402
33	1.852	0.1618	0.098	0.9065
34	2.559	0.0820	0.211	0.8103
35	0.587	0.5576	0.315	0.7305

As Table 4.17 suggests, there were no significant differences between the colleges in respect of the sub-tests of economics understanding. It is perhaps worthy of note however that the post test micro economics scores were only marginally not significant at the 5% level.

TABLE 4.17

ANALYSIS OF VARIANCE BY SUB TEST (N = 12)

SUB TEST OF ECONOMICS UNDERSTANDING	PRE TEST RESULTS: ARITHMETIC MEAN AVERAGE SCORES COLLEGES A	B	C	ALL	BETWEEN COLLEGES F.STAT.	SIG.	POST TEST RESULTS: ARITHMETIC MEAN AVERAGE SCORES A	B	C	ALL	BETWEEN COLLEGES F STAT.	SIG.
MICRO	4.73	4.57	4.37	4.57	0.368	0.6928	4.82	5.44	4.52	5.04	2.490	0.0877
TRADE AND COMPARATIVE SYSTEMS	2.91	2.58	2.73	2.71	0.753	0.4733	2.91	3.18	3.27	3.12	0.599	0.5511
MACRO	3.97	4.27	3.64	4.03	0.923	0.4006	4.06	4.48	3.96	4.24	1.201	0.3048

From this data it may be observed that with one exception, where no change was recorded, the arithmetic mean average scores in each sub test for each college increased, if only marginally. Changes took place in the relative position of each college, with College B showing the most improvement and College A the least.

t TESTS

The analysis of the data by means of t tests was also conducted on a basis of t_1 minus t_2, i.e. pre test score - post test score. Therefore the greater the negative difference between scores, the greater is the apparent gain recorded by the student in terms of economic understanding.

Using t tests for dependent sample means for all three colleges taken together, it is possible to identify statistically significant increases in student understanding in both the micro economics and trade and comparative systems sub-tests. In terms of probability, we can reasonably accept (i.e. be 95% confident) that the gains recorded were not the result of chance variables.

TABLE 4.18

T TEST RESULTS - ALL COLLEGES

SUB TEST OF ECONOMICS UNDERSTANDING	NUMBER OF CASES	ARITH. MEAN	STANDARD DEVIATION	DIFFERENCES ARITH. MEAN	DIFFERENCES STD. DEV.	T VAL.	DEGREES OF FREEDOM	2 TAIL PROBABILITY
MICRO t_1	111	4.5675	1.593	-0.4775	2.136	-2.36	110	0.020
MICRO t_2		5.0450	1.899					
TRADE AND COMPARATIVE SYSTEMS t_1	108	2.7315	1.189	-0.3704	1.5366	-2.47	107	0.015
TRADE AND COMPARATIVE SYSTEMS t_2		3.1019	1.360					
MACRO t_1	104	4.0385	1.910	-0.2981	2.185	-1.39	103	0.167
MACRO t_2		4.3365	1.530					

The results however do not appear to be very encouraging in terms of any meaningful development of economics understanding. A closer examination of Table 4.18 will reveal that the gains made were relatively minor ones. The arithmetic mean average score for the micro economics sub test increased by 0.2981, from its original 4.0385 to 4.3365 out of a possible score of 14. Similar interpretations may be made from the other two sub-tests. Two of the sub-tests of economics understanding may however be deemed to be statistically significant in respect of the increased test scores recorded but the gains in real terms appear to be at best very modest and only of marginal importance.

A more detailed breakdown of the data and the use of the test on each college's results suggests that in two of the colleges (A and C) there are no statistically significant differences in test scores between the pre and post tests.

TABLE 4.19

T TEST RESULTS COLLEGE A

SUB TEST OF ECONOMICS	NUMBER OF CASES	ARITH. MEAN	STANDARD DEVIATION	ARITH. MEAN	STD. DEV.	T VALUE	DEGREES OF VALUE	2 TAIL PROBA-BILITY
MICRO t_1	33	4.7273	1.420	-0.0909	1.990	-0.26	32	0.795
MICRO t_2		4.8182	1.776					
TRADE AND COMPARATIVE SYSTEMS t_1	33	2.9091	1.182	0.0	1.601	0.0	32	1.000
TRADE AND COMPARATIVE SYSTEMS t_2		2.9091	1.100					
MACRO t_1	32	3.9688	1.805	-0.1250	2.28[illegible]	-0.31	31	0.759
MACRO t_2		4.0938	1.594					

TABLE 4.20

T TEST RESULTS COLLEGE B

SUB TEST OF ECONOMICS UNDERSTANDING	NUMBER OF CASES	ARITH. MEAN	STANDARD DEVIATION	ARITH. MEAN	STD. DEV.	T VALUE	DEGREES OF FREEDOM	2 TAIL PROBA-BILITY
MICRO t_1	51	4.5686	1.591	-0.9020	2.300	-2.80	50	0.007
MICRO t_2		5.4706	1.793					
TRADE AND COMPARATIVE SYSTEMS t_1	50	2.5800	1.126	-0.5800	1.655	-2.48	49	0.017
TRADE AND COMPARATIVE SYSTEMS t_2		3.1600	1.557					
MACRO t_1	49	4.2653	2.187	-0.3469	2.213	-1.10	48	0.278
MACRO t_2		4.6122	1.412					

TABLE 4.21

T TEST RESULTS COLLEGE C

SUB TEST OF ECONOMICS	NUMBER OF CASES	ARITH. MEAN	STANDARD DEVIATION	ARITH. MEAN	STD. DEV.	T VALUE	DEGREES OF FREEDOM	2 TAIL PROBA-- BILITY
MICRO t_1	27	4.3704	1.822	-0.1481	1.895	-0.41	26	0.688
MICRO t_2		4.5185	2.119					
TRADE AND COMPARATIVE SYSTEMS t_1	25	2.800	1.323	-0.4400	1.227	-1.79	24	0.086
TRADE AND COMPARATIVE SYSTEMS t_2		3.2400	1.168					
MACRO t_1	23	3.6522	1.335	-0.4348	2.063	-1.01	22	0.323
MACRO t_2		4.0870	1.649					

It could be argued that with a matched sample, as in this case, the one way t test would be more appropriate. However, only in one case does it change the interpretation on the basis of statistical significance. In the trade and comparative systems sub test, the gain in scores of students from College C becomes significant at the 5% level.

The results of the t test analysis of the sub-test scores for College B do then suggest that there are statistically significant differences in the students' knowledge of micro economics and of trade and comparative systems, but not in macro economics. The findings for College A and C may in part be a function of the size of sample in that both institutions provided fewer students than College B. However it is unlikely to be the entire explanation, if it is relevant at all, and it is possibly the result of other variables. Such variables might include the quality of the teaching input and the manner in which the course is implemented within the college. Such interpretations do however rest on the assumption that the test provides a valid assessment of what the students have learnt.

PEARSON'S PRODUCT MOMENT CORRELATION COEFFICIENTS

Pearson's product moment correlation coefficients were calculated in an attempt to establish the relationship between the background data and the test and item scores. It may be seen from the correlation matrices which follow that statistically significant relationships between the criterion variables and the test items are somewhat scattered. The fact that caution must be exercised in the use of correlation analysis is well expressed by Cohen and Manion (1980) who state that "correlation research only identifies what goes with what - it only implies concomitance and therefore does not necessarily establish cause and effect relationships"

An examination of the apparently statistically significant relationships between criterion variables and test items suggests that 41 occur in the pre test and 29 in the post test. However only 4 of them are common to both tests: Course on which enrolled/question 5, entry qualifications/question 7, previous course in economics/question 26 and previous course in mathematics/question 25.

TABLE 4.22

STATISTICALLY SIGNIFICANT PEARSON'S CORRELATION COEFFICIENTS.

QUESTION NUMBER		AGE	SEX	COURSE	ENTRY QUALIFICATIONS	EMPLOYER'S BUSINESS	STUDENT'S OCCUPATION	PREVIOUS ECONOMICS	COURSE IN COMMERCE	MATHEMATICS	READING BUSINESS MATERIAL	INTEREST	IMPORT. OF ECON.	COLLEGE
PRE TEST.	3										-X			
	5		-X	X		X	X							
	7	X			-X			X				-X	-X	
	9				X			-X						
	10		-X								-X	-X		
	12													-X
	13			X	-X	X				-X				
	14													-X
	16	X												-X
	17	X												
	18		X											
	20					-X								X
	22												X	
	23	X		X			X							
	25		-X							-X				
	26							-X						
	27	X	-X								-X			
	29							-X						
	30				X									-X
	32			X			-X							
	33		-X											-X
	34					-X					X			-X
	35											-X		
POST TEST.	2	X		X		X	X			X	-X			
	3		-X							-X				
	5			X			X							
	7		-X		-X									
	8							X						-X
	9												X	
	11	X												-X
	15				X	-	x			X	-X			
	16							X						
	17						X							
	19							X						
	21		-X											
	25									-X				
	26							-X						
	28	X												
	30										-X			
	32							-X			X			
	34								-X					
	35									X				

X = Positive correlation (P - less than 0.05)

-X = Negative correlation (P = less than 0.05)

TABLE 4.23

SUB TESTS OF ECONOMIC UNDERSTANDING	SEX	ENTRY QUALIFI-CATIONS	AGE	COURSE ON WHICH ENROLLED	EMPLOYERS BUSINESS	STUDENT OCCUPATIONS	PREVIOUS ECONOMICS	COURSE IN COMMERCE	MATHEMATICS	READING OF BUSINESS MATERIALS	ECONOMIC INTEREST.	IMPORTANCE OF ECONOMICS.
MICRO t_1	[illegible]	-0.0521	0.0270	0.0588	[illegible]	0.0528	-0.0143	0.0159	-0.0542	[illegible]	[illegible]	0.1142
	[illegible]	P=0.294	P=0.389	P=0.270	[illegible]	P=0.291	P=0.441	P=0.434	P=0.286	[illegible]	[illegible]	P=0.116
TRADE AND COMPARATIVE SYSTEMS t_1	-0.0125	-0.0380	0.0601	-0.0233	-0.1044	0.0105	-0.0908	0.0729	0.0127	-0.0218	-0.0324	-0.0818
	P=0.449	P=0.347	P=0.267	P=0.405	P=0.140	P=0.457	P=0.174	P=0.226	P=0.448	P=0.411	P=0.369	P=0.199
MACRO t_1	[illegible]	[illegible]	0.0579	0.0099	-0.0645	0.0111	-0.1461	0.0144	-0.1184	-0.0202	-0.0824	[illegible]
	[illegible]	[illegible]	P=0.278	P=0.460	P=0.256	P=0.455	P=0.068	P=0.442	P=0.113	P=0.419	P=0.201	[illegible]
MICRO t_2	-0.1087	0.1187	0.0116	0.0743	-0.0055	0.0608	0.0158	0.0256	-0.0874	-0.1013	0.0522	[illegible]
	P=0.127	P=0.106	P=0.452	P=0.218	P=0.477	P=0.262	P=0.434	P=0.394	P=0.180	P=0.144	P=0.292	[illegible]
TRADE AND COMPARATIVE SYSTEMS t_2	-0.0743	0.0630	0.0384	0.0575	-0.1091	0.0716	0.0366	0.0645	[illegible]	-0.0321	-0.1315	-0.0427
	P=0.220	P=0.257	P=0.345	P=0.276	P=0.128	P=0.229	P=0.352	P=0.252	[illegible]	P=0.370	P=0.085	P=0.329
MACRO t_2	-0.1808	0.0030	0.0282	-0.0615	-0.0879	-0.0453	-0.2282	-0.0700	-0.0330	-0.1105	-0.1039	0.0503
	P=0.030	P=0.488	P=0.385	P=0.262	P=0.182	P=0.320	P=0.009	P=0.235	P=0.367	P=0.126	P=0.141	P=0.302
MICRO(t_1-t_2)	-0.0753	-0.1195	0.0141	0.0063	[illegible]	0.0130	-0.0326	-0.0151	-0.0155	-0.0444	[illegible]	-0.0749
	P=0.215	P=0.105	P=0.442	P=0.474	[illegible]	P=0.446	P=0.367	P=0.437	P=0.436	P=0.321	[illegible]	P=0.216
TRADE AND COMPARATIVE SYSTEMS(t_1-t_2)	0.1048	-0.0274	-0.0056	-0.0760	0.0034	-0.0642	-0.1298	-0.0078	[illegible]	0.0064	0.1133	-0.0149
	P=0.136	P=0.387	P=0.477	P=0.213	P=0.486	P=0.251	P=0.086	P=0.468	[illegible]	P=0.473	P=0.117	P=0.438
MACRO(t_1-t_2)	-0.9876	[illegible]	0.0391	0.0912	0.0724	0.0780	0.0195	0.0508	[illegible]	0.0349	-0.0237	0.0999
	P=0.179	[illegible]	P=0.341	P=0.169	P=0.224	P=0.207	P=0.419	P=0.297	[illegible]	P=0.357	P=0.402	P=0.147

[illegible] = Significant at the 0.05 level.

P = Significance.

In respect of the sub tests within the total test of economic understanding, it is interesting to note the apparent influence of gender on the pre test performance of students in both micro and macro economics, in so far as males were more likely to score a higher number of correct responses. Post test findings suggest that this influence had become statistically 'not significant'.

Other relationships which appeared as significant in the pre test results were - entry qualifications and a view that economics is unimportant in today's world with the macro economics sub test. Micro sub test scores correlated at a significant level with the nature of the employer's business, the reading of financial/business materials and a stated interest in economics on the part of the student. Post test relationships comprised micro economics sub test scores with a view that economics is unimportant in today's world and trade and comparative systems scores with the satisfactory completion of a prior course in mathematics.

Statistical significance is also indicated in certain cases by the difference in recorded scores between the two test (t_1-t_2) and background variables. In respect of the micro economics sub tests it would appear that both the nature of the employer's business and the student's declared interest in economics may be regarded as having a statistically significant association with the gain in test score.

Improvements in macro economics understanding are indicated to be related to the student's entry qualifications and as to whether students had successfully completed a prior course in mathematics.

The p statistic in the correlation matrix indicates the probability that these results are due to a relationship and are not random. The number of cases for each coefficient calculated is for most items the full 112 students. At no time does this figure fall below 104. It follows therefore that the size of the correlation coefficient required to be regarded as significant is small - less than 0.2. Such criteria do not fill one with great confidence however in terms of drawing any meaningful conclusions from the data.

This situation is further put into perspective by Cohen and Manion (1980) in their reference to the writing of Borg (1963). Borg states that for populations in excess of one hundred, a correlation coefficient within the range 0.20 to 0.35 is indicative of only a very slight relationship between the variables although they might be statistically significant. A correlation of 0.20 shows that only 4% of the variance is common to the two measures, and whereas correlations at these levels may have limited meaning in explanatory relationship research, they are of no value in either individual or group prediction studies. The statistical significant coefficient in this research range from 0.1535 to 0.3717. The larger figure is the only one to exceed 0.35. It would appear reasonable to assume therefore that these measures of association do not suggest any relationships in which we might have real confidence.

The reliability and validity of much of this correlation exercise may also be challenged on the basis of statistical relevance. Pearson's product moment correlation coefficients are appropriate for use given a linear relationship and thought by many statisticians to be unsuited to the consideration of dichotomous variables such as sex differences. Some researchers have however claimed that the treatment of such variables in this way is acceptable. I refer primarily to the writings of Labovitz (1969) and Kim (1971).

REGRESSION ANALYSIS

Regression indicates the degree of association between a number of variables. It is related to the correlations of the independent variables with the dependent variables but also to the intercorrelations between dependent variables. It has been used in this research to examine the differences in test scores as a function of background. The method used is the recently developed stepwise regression analysis. The purpose is to identify the most important or significant variable predictor of the test scores, then to identify the second most significant predictor and so on.

The application of regression analysis to this data set in fact shows very few predictors when all the independent variables are taken together. It may be seen from Table 4.24 that only gender and a student's reading of the financial/business section of a newspaper or magazine on a regular basis appear to predict statistically significant test scores with regard to the macro and micro sub tests of economic understanding respectively. Neither of them are shown to be significant in respect of the post test, when only the exposure to a previous economics course appears to predict significantly and then in terms of macro sub test scores.

In the Economics Education Project, the researchers found that prior knowledge of economics was useful and gave an advantage which did not disappear throughout University study. In this research, prior knowledge appears to affect only one part of the total test of understanding and only in the post test. It is worth recalling however that the Economics Education Project measure of prior knowledge was the GCE A level in economics and not the level, or its equivalent, as in this case.

Only one variable appears to make a difference in test scores, i.e. student's self expressed interest in economics, and this is only in respect of the micro economics sub test.

TABLE 4.24

STATISTICALLY SIGNIFICANT REGRESSIONS

SUB TEST OF ECONOMICS UNDERSTANDING	IDENTIFIED PREDICTOR	BETA	MULTIPLE	t TEST	SIGNIFICANCE
MICRO t_1	READING FINANCIAL BUSINESS MATERIAL	-0.21469	0.21469	-2.187	0.0311
TRADE AND COMPARATIVE SYSTEMS t_1	NONE				
MACRO t_1	GENDER	-0.22237	0.22237	-2.269	0.0254
MICRO t_2	NONE				
TRADE AND COMPARATIVE SYSTEMS t_2	NONE				
MACRO t_2	PREVIOUS COURSE IN ECONOMICS	-P.22319	0.22319	-2.278	0.0249
MICRO t_1-t_2	INTEREST IN ECONOMICS	-0.21165	0.21165	-2.155	0.0336
TRADE & COMPARATIVE SYSTEMS t_1-t_2	NONE				
MACRO t_1- t_2	NONE				

5. CONCLUSIONS

It is apparent from the data set of this research and the analyses undertaken that the level of economics understanding of this sample population, as measured by the test instrument used, is at best limited. Only one of the three colleges examined produced what might be statistically acceptable as significant increases in the students' abilities in the area. Even then the gain was confined to the micro economics and trade and comparative systems sub tests within the total test. The gains themselves were very small yet statistically significant.

Obviously one cannot be fully confident that the test itself was a good measure of economic understanding. Feedback from two of the three colleges concerned, including the one in which the statistically significant gains were recorded, involved complaints by the students that the terminology of the individual test items was both unfamiliar and confusing. It is possible that the understanding which the students possessed initially and developed during the course was not measured accurately by this test.

Assuming however that the test was an appropriate measure to use, what do these results tell us? First, that little difference in the economics knowledge of the students tested was displayed by them in completing the two tests even though they had been exposed to the second year of the BEC National level course. Secondly, that few of the independent variables identified as having a potential relationship with measures of economics understanding in other research could be shown to be significant. Indeed in the pre tests, only one of the criterion variables, namely the regular reading of financial/business materials, was shown to be so in respect of the micro sub test. Similarly in the macro sub test, only gender was shown to be significant. The influence of both of these variables had seemingly disappeared in the post test results.

The finding on the basis of gender differences supports the belief of Siegfried (1980), that if economics understanding is measured as a flow in respect of gains made over time, women perform no differently to men.

The post test predictors were in fact even more scarce. Only one could be identified using regression analysis, namely that of previous exposure to an economics course and then only on the macro sub test. Why this should be so for the post test and not the pre test is interesting. It may be an indication that by the end of the course some students with previous exposure were at last making progress (and by implication had not been at the time of the pre test). Furthermore, those without this exposure had not received sufficient economics to be in a similar position.

This may be thought consistent with the belief that insufficient attention is paid to economics in the BEC national level course and that as a result the level of economics understanding which can be achieved as a result is limited. Questions concerning the possible lack of structure and sequence are obviously apposite here.

It should be stressed however that this significance with respect to previous exposure to economics only relates to the macro based sub test and does not carry over in terms of an explanation for the differences in scores on the pre and post tests. The only statistically significant independent variable in respect of differences, i.e. gains in economics when related to the micro results only. This, at least in part, appears to support Sloan's (1972) findings that prior interest in economics is positively related to post test scores.

Many potentially influential variables were not considered in this research partly as a result of limited resources, and partly from the difficulty of meaningful quantification. It is possible that the significant differences recorded relect such variables. One possible explanation of inter college differences may be a more

interesting and thought-provoking approach on the part of the teaching staff of one college. It is known that in each of the three colleges the teaching of the 'Organisation in its Environment' module to these students was not confined to one individual but to a course team. It is notable that in the college which recorded the most gain in understanding, no less than five economics teachers were involved.

This is not to say that a course team working in close co-operation could not have collectively provided an interesting and stimulating approach. Also it is not impossible that the gains made by students of this particular college were related to the contributions of one or two members of that course team.

A further potential influence on the test scores, and therefore the measure of economics understanding, is the range of support subjects or modules offered in each course. These differ in each of the colleges providing students and between courses within the same college. In the college with the most significant gains in understanding, many of its full time students took International Trade as an option module during the second year of their course. Others, both full and part time, took Banking as a separate module. It is possible that a BEC course which combines the Organisation in its Environment core module with these associated optional modules provides a more economics orientated education.

The results, as an indication of the level of economics understanding attained, were disappointing. The BEC would no doubt be at pains to point out that a national level course of study does not hold as a major objective the development of an economically literate student. I have however indicated earlier my belief that an understanding of the economy and its component parts does have widespread relevance for the business community, including its junior members.

This research indicates that a knowledge and understanding of economics is unlikely to be effectively developed 'en route' as a by-product of the education provision of the present course. If economics understanding is felt to be relevant to the BEC national level student then a more positive regard must be paid to the teaching of economics within these courses.

The overriding benefit of the BEC approach is surely that it has encouraged teachers to assess what they are doing and to think in terms of what their aims and objectives are.

It is to be hoped that it has led teachers to regard the learning environment as more than simply a vehicle for ensuring the examination success of their students. This development could be harnessed to a course provision which encompasses the development of economics understanding, and as it does incorporate the higher level skills of evaluation and application, this could be achieved with genuine relevance to the modern economy.

A review of the present position with a positive determination to establish a modern approach to economics would, it is hoped, both generate informed and useful employees and take advantage of the skills, expertise and goodwill of economics teachers throughout the further education sector.

APPENDIX 1

THE QUESTIONNAIRE

COGNITIVE GAIN IN ECONOMICS IN BUSINESS EDUCATION COUNCIL NATIONAL LEVEL COURSES

Please state your name, age and sex below and then answer the following questions; where appropriate circle the correct response from those given. All returns will be treated in confidence.

1. SURNAME ..... FORENAMES ..... 2. AGE .....(years)

3. SEX Male, Female. 4. COURSE ON WHICH ENROLLED .....

5. What were the qualifications with which you gained entry to the course?

BEC General Certificate/Diploma, GCE 'O' +/or CSE Grade 1s.
Over 19 years of age rule.
Please specify.....

6. Mode of attendance: full-time part-time day

7. If you are NOT a full-time student and are employed

(a) What is the nature of your employer's business?
Banking, Local Government, Nationalised Industry, Private Enterprise other than banking. Other (please state which) .....

8. Did you previously take a course in:

(a) Economics? ..... YES/NO
If YES please state which course(s) e.g. GCE 'O', CSE, and state your result and grade .....

(b) Commerce? ..... YES/NO
If YES please state which course(s) e.g. GCE 'O', CSE, and state your result and grade .....

(c) Mathematics ..... YES/NO
If YES please state which course(s) e.g. GCE 'O', CSE, and state your result and grade .....

9. Do you read the financial/business section of a newspaper/magazine regularly?
YES/NO .....
If YES please state which .....

10. How would you rate your present interest in economics?
very high high average low very low

11. How important do you think a general understanding of economics is in today's world?
very important important faily important
fairly unimportant very unimportant

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